POWER & ENERGY CONFERENCE:
ELECTRIC VEHICLES AND ENERGY STORAGE

Administered by Cal Poly IEEE Power & Energy Society,
Cal Poly Electrical Engineering Department,
& Cal Poly Electrical Power Institute (EPI)

CAL POLY
SAN LUIS OBISPO

May 10, 2013
9:15 a.m. to 4:30 p.m.
ADVANCED TECHNOLOGY LABS
& BONDERSON PROJECT CENTER
On behalf of the Electrical Engineering Department at Cal Poly and the IEEE-Power & Energy Society, we welcome you to our **Cal Poly Power and Energy Conference: Electric Vehicles and Energy Storage**. The conference is a complimentary opportunity for you to experience some new, exciting, and innovative projects involving our students, faculty, and industry. The conference schedule is as follows:

**TRACK 1** (Advanced Technology Labs) 

9:15 A.M. - 10:15 A.M. 
Welcome from College of Engineering *(Debra Larson – Dean of Engineering)* 

“Chevy Volt: Performance and Driving Experience” 
Speakers: *Dale Dolan – Cal Poly Faculty, Electrical Engineering*

10:15 A.M. - 11:00 A.M. 
“Electric Vehicle Charging Infrastructure” 

11:00 A.M. - 11:30 A.M. 
“Plug-In & Hybrid Electric Vehicle Charging Impacts: A Survey of California’s Utility Companies” 
Speaker: *Russell Tatro – Sacramento State Faculty, Electrical and Electronic Engineering*

11:30 A.M. - 12:00 P.M. 
“Tesla Model S: Driving Experience & What’s Next” 
Speaker: *Rick Bergquist – Cal Poly Alumni*

12:00 P.M. - 1:00 P.M.  
LUNCH and Student Presentations

1:00 P.M. - 1:30 P.M. 
“Energy Storage Pilot Projects and Opportunities at PG&E” 
Speaker: *Jon Eric Thalman – Director Regulatory Strategy, Electric Operations Pacific Gas and Electric*

1:30 P.M. - 2:00 P.M. 
“Advanced Battery Technology and the Nissan Leaf” 
Speaker: *John Dunning – Cal Poly Scholar in Residence, Electrical/Mechanical Engineering*

2:00 P.M. - 2:30 P.M. 
“Challenges of EV Integration into the Modern Grid” 
Speaker: *Mike Colburn – Research and Development Manager, San Diego Gas & Electric*

2:30 P.M. - 3:00 P.M. 
“The Cal Poly Rapid Battery Exchange (RBX) Project” 
Speaker: *Art MacCarley – Cal Poly Faculty, Adam Morris, Michael DeSando, Scott Spielman and Nathan Hara, Cal Poly Students*

3:30 P.M. - 4:30 P.M. 
Networking, Student Project Presentations and Refreshment Break

**TRACK 2** (Bonderson Project Center) 

1:00 P.M. - 1:30 P.M. 
“The State of the Art in Automotive Energy Alternatives” 
Speaker: *Art MacCarley – Cal Poly Faculty, Electrical Engineering*

1:30 P.M. - 2:00 P.M. 
“Application of Battery Energy Storage Systems in Peak Load Shaving” 
Speaker: *Mahyar Zarghami – Sacramento State Faculty, Electrical and Electronic Engineering*

2:00 P.M. - 2:30 P.M. 
“Ultracapacitors for Hybrid and Electric Vehicles” 
Speaker: *Shaw Lynds – R&D Systems Engineer, Maxwell Technologies*
**CHARLES BOTSFORD**  
**Business Development, Efficient Energy Systems, AeroVironment, Inc.**

P.E., B.S., Chemical Engineering, University of New Mexico, 1978, M.S., Chemical Engineering, University of Arizona, 1982.

Mr. Botsford is a professional chemical engineer (California) with 30 years experience in engineering process design, distributed generation, and environmental management. He has a wide range of experience relative to oil refining, power electronics, renewable energy systems, electric vehicles, and air quality issues. Mr. Botsford is a Qualified Environmental Professional (QEP), Emeritus and conducts business development activities in AeroVironment’s Efficient Energy Systems group.

Email: botsford@avinc.com

---

**RICK BERGQUIST**  
**Co-Founder, REC Solar**  
**CEO, Synnove Energy**

Rick loves innovative technology and has the inclination to be on the leading/bleeding edge of technology. That's the reason he purchased his Tesla S -- it is a wonderful car that is the first electric car matching the range, performance, and luxury of conventional ICE cars.

In 1988, Rick joined PeopleSoft as the sixth employee of a fledgling start-up company. Rick was a programmer for the PeopleTools development environment and worked on the original Human Resources UI (User Interface) as PeopleSoft led the industry in the development of Client/Server applications. As a developer, Rick is the Inventor of 3 patents. Rick moved on to lead the PeopleTools organization and then became PeopleSoft’s Chief Technology Officer. He was part of the team that transitioned PeopleSoft to be the first application vendor to completely transition their applications to be internet based.

Rick graduated from Cal Poly in 1977 with a degree in Computer Science. At graduation, the Cal Poly ACM (Association for Computing Machinery) club voted for Rick as the "Freakiest Computer Freak". Currently he serves on the CSC Industry Advisory Council, Cal Poly President’s Cabinet, and the Cal Poly Foundation.

---

**JOHN DUNNING**  
**Cal Poly Scholar in Residence**  
**Electrical/Mechanical Eng.**

B.S., M.S., Ph.D. Electrochemical Engineering, University of California, Los Angeles.

From 1971 to 1988, Dr. Dunning served as Assistant Head of the Electrochemistry Department at the General Motors Research Laboratories. In 1988, he established the West Coast Operations office and laboratories of General Motors’ Delco Remy Division. In 1997, he joined General Motors Advanced Technology Vehicle Platform, where he managed multinational programs for the United States Advanced Battery Consortium (USABC) and the Program for a New Generation Vehicle. Dr. Dunning’s primary research area has been electrochemical energy conversion and storage. He developed batteries and fuel cells for transportation applications, as well as specialized electrochemical and chemical processes. He also developed a battery for the Impact prototype vehicle, later the production EV-1. His work has supported motor and motor control development, hybrid vehicles such as the GM-Allison Hybrid Transit Bus, and other advanced battery test equipment. After retiring from General Motors, Dr. Dunning established Epsilon Research Services, a consulting firm that assists business, government, academic and public policy clients in developing advanced technology for the transportation, defense, health and energy sectors. He also served as Executive Director of ElectriCore from 2001-2004. This non-profit organization collaborates with industry and universities for design, demonstration, and deployment of advanced technologies in private-public partnerships with the Departments of Defense, Energy, Transportation and others. Dr. Dunning’s contributions include patents and publications in the field of electrochemical engineering. He has been active in electric vehicle competitions, where he has set world records for fast charging and quick-change battery technology and electric vehicle racing. He has given numerous presentations worldwide and served on advisory boards for the U.S. Department of Energy and international organizations. His R&D teams have received both the General Motors President’s Council Honors Award and the prestigious Kettering Award.

---

**JON ERIC THALMAN**  
**Director Regulatory Strategy, Electric Operations, Pacific Gas and Electric**

Jon Eric Thalman is Director of Regulatory Strategy for the Electric Operations business at Pacific Gas and Electric Company. His department supports PG&E’s Transmission Owner and General Rate Case regulatory filings and supports strategy and policy development for new electric transmission and distribution technologies. During Jon Eric’s 15 year tenure, he has participated in planning the bulk electrical transmission system as well as developing planning methodologies, standards, and applications with the Western Electricity Coordinating Council, North American Electrical Corporation, California Independent System Operator, and with the California Transmission Planning Group. He has developed a variety of electric transmission projects, including the Path 15 500 kV Line Upgrade and Remedial Action Scheme. Currently, he is implementing two, NAS Battery Energy Storage System pilot projects.
MAHYAR ZARGHAMI
Sacramento State Faculty, Electrical and Electronic Engineering

Mahyar Zarghami received his Ph.D. from Missouri University of Science and Technology, USA in Electrical Engineering in 2008. He has more than 12 years of industrial experience inside and outside the U.S., the most recent having been with US Corporate Research Center, ABB Inc. from 2008 to 2011. Mahyar is currently an assistant professor with the Electrical and Electronic Engineering Department at California State University, Sacramento. Dr. Zarghami is a member of IEEE and his research interests include Power System Dynamics, Operation and Control, Power System Modeling and Simulation, Integration of Renewables in Power Systems and Applications of Smart Meters and Synchronized Measurements in Wide Area Control and Protection of Power Systems.

MICHAEL COLBURN
Research and Development Manager, San Diego Gas & Electric

Mike Colburn is Manager of Research and Development at San Diego Gas and Electric Co. (SDG&E). He leads the Technology Innovation and Development group, in charge of implementation and testing of new technology and developing smart grid projects, in the Asset Management and Smart Grid Projects Department at San Diego Gas and Electric Co (SDG&E). Mike has worked at various management and engineering positions at SDG&E for 31 years, including field and staff engineering, and distribution control center technical support management. He earned his Bachelor’s Degree in Electrical Engineering at Cal Poly - SLO, is a member of IEEE, and is a registered professional engineer in California. Mike teaches Electrician and Lineman Apprentice School through San Diego City College, and is a proponent of electric transportation, as an EV owner/driver for business and personal use since the late 1990’s. Mike is a licensed pilot, certified and endorsed for single engine land - high performance aircraft.

R. SHAW LYNDS
R&D Systems Engineer, Maxwell Technologies

Shaw Lynds is a Sr. System Engineer at Maxwell Technologies Inc. Shaw is active in the development of next generation ultracapacitor modules and hybrid systems. He holds a BS degree in mechanical engineering from the University of California at Santa Barbara, and MS in Mechatronics from California Polytechnic in San Luis Obispo. Shaw initially joined Maxwell as an applications engineer, where he learned firsthand the challenges and opportunities in the hybrid bus market. He has since been promoted to the Sr. Systems Engineer for Maxwell’s R&D group where leads development of next generation energy storage systems and devises. Email: slynds@maxwell.com

RUSSELL TATRO
Sacramento State Faculty, Electrical and Electronic Engineering

Russ Tatro earned his BA in Psychology with Business minor at the University of North Carolina in 1975. He switched to electronics with BSEE and MSEE degrees from California State University, Sacramento in 1992 and 2000. Mr. Tatro joined Sac State as a lecturer with a concentration in optoelectronics and analog device engineering in 2001. He is currently a researcher in the California Smart Grid Center and researches technologies that enable power consumers to embrace renewable energy. Mr. Tatro’s prior experience was in aerospace system development with the US Air Force. He served as a navigator in B-52G at Wurtsmith Air Force Base (AFB), Michigan, RC-135S aircraft at Eielson AFB, Alaska and as a special project officer for reconnaissance system procurement at E-Systems, Texas.

DR. ART MACCARLEY
Electrical Engineering

C. Arthur (Art) MacCarley, Ph.D., PE. California Polytechnic State University, San Luis Obispo, California (Cal Poly)

Ph.D., Electrical Engineering, Purdue University, 1987 M.S Electrical Engineering 1978, BS Mechanical Engineering 1976, UCLA. Professor of EE and Computer Engineering and Director of the Cal Poly Transportation Electronics Laboratory. Chair of the Cal Poly Electrical Engineering Department 2007-2010 and Director of the Computer Engineering Program 2000-2003. Recent funded research activities on alternative fuels, electric propulsion for automobiles and transportation electronics. Founding research on hydrogen and alcohol fuels in the 1970’s. Research clients include the California Department of Transportation, National Science Foundation, California Office of Traffic Safety, US Dept of Energy, US Dept of Transportation, UC Berkeley, UC Irvine. Previously Senior Engineer with American Bosch and Director of the Alternative Fuels Laboratory at the University of Denver Research Institute. He has published 132 technical journal and conference papers and serves on the editorial review boards of four journals.
DR. DALE DOLAN
Electrical Engineering

Professor Dolan is the Hood Assistant Professor of Electrical Engineering at Cal Poly with experience in renewable energy projects, education and advanced motor drives. He has published research on the construction of a wind turbine emulator using advanced motor drives and on the modeling and construction of a novel virtual air gap variable reactor. He is past chair on the board of directors of Windy Hills Caledon Renewable Energy, past chair of the Ontario Sustainable Energy Association (OSEA) Board and was an executive chair of the 7th World Wind Energy Conference 2008 (WWEC 2008). He was a member of the management committee for the Ontario Green Energy Act campaign that implemented the most progressive renewable energy policy in North America. He is also currently the Chair of the IEEE Central Coast PES (Power and Energy Society) Chapter. His research interests involve sustainable/renewable energy generation, wind power generation, power systems, electromagnetics, power electronic applications for distributed generation, grid connection impacts of renewable generation, energy policy promoting widespread implementation of sustainable power generation, sustainable energy project economics and sustainability of technologies. He is committed to making renewable energy a strong component of the world’s supply mix to reduce greenhouse gas emissions worldwide.

DR. AHMAD NAFISI
Electrical Engineering

Professor Nafisi received his Ph.D. degree in Electrical Engineering from University of Southern California in 1983. He joined the Electrical Engineering Department at Cal Poly in 1984. Dr. Nafisi has done consulting and research activities with Electro-Kinesis Inc. (a Division of Superior Electric Company), Southern California Edison, PG&E, and Los Angeles Department of Water and Power. Dr. Nafisi’s fields of interest are electric machines, power systems analysis, power quality, and magnetic materials. He is a member of the IEEE and PES.

DR. DENNIS DERICKSON
Electrical Engineering

Dennis Derickson is the Chair of the Electrical Engineering Department. He received his BS, MS, and Ph.D. degrees in electrical engineering from South Dakota State, the University of Wisconsin and the University of California at Santa Barbara in 1981, 1982 and 1992. Dr. Derickson was with Hewlett Packard/Agilent Technologies from 1982 to 2000 working on high frequency electronic and optical instrumentation. From 2000 to 2005 he was director of product marketing at Cierra Photonics. Dr. Derickson joined the electrical engineering faculty at Cal Poly in 2005.

DR. TAUFUK
Electrical Engineering

Dr. Taufik was born and raised in Jakarta, Indonesia, where he graduated from his High School as the Valedictorian of his class. He came to the US to study and received his BS in Electrical Engineering with minor in Computer Science from Northern Arizona University (Cum Laude), MS in Electrical Engineering from University of Illinois Chicago, and Doctor of Engineering from Cleveland State University. He joined the EE department at Cal Poly State University in 1999 where he is currently a tenured Professor. He is a Senior Member of IEEE and has done consulting work and has been employed by several companies including Capstone Microturbine, Rockwell Automation (Allen-Bradley), Picker International, San Diego Gas & Electric, APD Semiconductor, Diodes Inc., Partoe Inc., and Enerpro.

DR. BILL AHLGREN
Electrical Engineering

William Ahlgren is Associate Professor of Electrical Engineering in the California Polytechnic State University at San Luis Obispo. His degrees are B.S. in Physics, M.S. in Energy Systems Engineering, and Ph. D. in Electric Power Engineering with thesis in Materials Science. He has been involved in solar energy research since writing an undergraduate thesis on shallow solar ponds for industrial process heat. His research has included photovoltaic device development as well as photo-electrochemical systems for solar-assisted hydrogen production and the electro-winning of copper, and also electrochemical methods for the low-cost production of thin-film photovoltaic devices. His current interest is in high-efficiency electrochemical energy conversion systems to promote the use of renewable energy.

DR. ALI SHABAN
Electrical Engineering

Professor Shaban received his Ph.D. degree in Electrical Engineering from Oregon State University in 1985. He joined the Electrical Engineering Department at Cal Poly in 1984. Since 1985, Dr. Shaban has done consulting work with Chevron, Southern California Edison, JPL Scientific, and Bluepoint Associates, Ltd., in San Luis Obispo. Dr. Shaban’s field of interest is electric machines, power quality, power systems analysis, and power systems protection. He has published in the areas of synchronous machines, induction motor, reliability, and power quality. He is a member of the IEEE and PES.

FACULTY WEBSITE: http://www.ee.calpoly.edu/faculty/